

SECTION 12345 - METAL LABORATORY CASEWORK AND FUME HOODS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes, but is not limited to, all materials, labor and equipment, complete with all anchors and related accessory, necessary to furnish, deliver and install:
- B. Open bypass design chemical fume hoods, complete with fixtures, supports, lighting fixtures, cup sinks, etc.
- C. Open bypass design, ADA compliant chemical fume hoods, complete with fixtures, supports, lighting fixtures, cup sinks, etc.
- D. Biosafety cabinets, complete with fixtures, supports, lighting fixtures, etc.
- E. Metal Casework including:
 - 1. Acid Storage Cabinets for Use Under Fume Hoods
 - 2. Solvent Storage Cabinets for Use Under Fume Hoods
 - 3. Vacuum Pump Cabinets
 - 4. Goggle Cabinets
 - 5. Miscellaneous fillers and panels required for a finished installation
- F. Overhead Service Carriers
- G. Although such work is not specifically shown or specified, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
- H. For general requirements, applicable to this and all other Casework Specification Sections including, but not limited to definitions, system description, submittals, quality assurance, mock-up, testing, field measurements, pre-installation conference, delivery, storage and handling, project conditions, and sequencing requirements, refer to Specification Section 12340 - Laboratory Casework - General Requirements.
- I. Products Installed But Not Specified Under This Section:
 - 1. Section 12309 - Laboratory Service Fixtures: Supply of service fixtures for fume hoods for placement under this Section
- J. Fume Hood Test Mock-Up
 - 1. General: Comply with provisions of Division 1.
 - 2. Fume Hood Test Mock-Up:
 - 3. Construct an operating prototype of the type of hood to be supplied for Project and demonstrate its ability to comply with fume hood performance requirements.
 - 4. Test Method: ANSI/ASHRAE Test 110-1995.

5. Perform test under controlled conditions in manufacturer's test facility.
6. Perform engineering and physical modifications on prototype to comply with performance requirements.
7. Manufacturer retains ownership of prototype.
8. Manufacturer bears costs of test mock-up and modifications to achieve performance criteria.
9. Performance requirement: Meet or exceed the recommendations of the American
10. Conference of Governmental Industrial Hygienists as defined in the most recent edition of "Industrial Ventilation. A Manual of Recommended Practice."
11. The fume hood, with vertical rising sash, shall provide adequate containment (meet ASHRAE standard) when combined with a CV system set point of 100 fpm at full open and 80 fpm when the sash is set at 18" (normal operating height).

K. Acceptance:

1. Make adjustments necessary to meet minimum performance testing criteria and obtain acceptance from Architect. Do not proceed with shop fabrication or Project installation until mock-up has been tested, and accepted by Architect.
2. Accepted mock-up establishes minimum performance standards and quality for workmanship and materials for Project.

1.02 OPERATION AND MAINTENANCE DATA

- A. Submit manufacturer's printed, operation and maintenance data.
- B. Prior to final acceptance, affix one copy of each manual described in Demonstration Article to an unobscured exterior side panel of each hood.
- C. Prior to final acceptance, submit certification that hazardous material cabinet has been electrically grounded as specified.

PART 2 - PRODUCTS

2.01 GENERAL

- A. For general requirements, applicable to this and all other Casework Specification Sections including, but not limited to, manufacturers, materials, components, and finish and performance requirements, refer to Specification Section 12340 - Laboratory Casework - General Requirements.

2.02 MANUFACTURERS

- A. Acceptable Manufacturers:
 1. Metal casework, chemical fume hoods, ADA compliant chemical fume hoods, and miscellaneous fillers and panels required for a finished installation:
 - a. Kewaunee Scientific Corporation, Statesville, NC
 - b. Jamestown Metal Products, Inc., Jamestown, NY
 - c. Mott Manufacturing Limited, Brantford, ON, Canada

2.03 COMPONENTS

A. Services for Hoods:

1. Hoods shall be pre-piped and pre-wired at the factory. Plumbing and electrical services shall be as follows:
2. Plumbing services shall consist of remote control valves as selected located within the end panels, controlled by extension rods projecting through the control panels of the hood, with color coded plastic handles. Interior fitting for gases and water shall be nylon panel flanges and angle serrated hose connectors, color coded. All plumbing fittings shall be factory installed and piped between the valve and the outlet. Piping shall be routed to the rear of the hood, in the side of the hood that the fittings are mounted. If fittings are mounted in both ends, there shall be two connection points. Piping shall be routed to the top of the hood, as shown on drawings. Location of plumbing services at ADA hoods shall comply with ADAAG requirements.
3. Pre-Wired hoods shall be wired using flexible metallic conduit to a single junction box located at the top of the hood for a single point connection at the job site. Electrical services shall consist of two duplex receptacles and a light switch. The duplex receptacles shall be 20 Amp, 125 volt AC, and 3-wire polarized grounded. The receptacles shall be of specification grade, ground fault interrupter type, side wired only, to insure a positive connection. The light switch shall be 20 Amp, 125 volt AC, and 3-wire polarized grounded. Location of electrical services at ADA hoods shall comply with ADAAG requirements.

2.04 OPEN BYPASS CHEMICAL FUME HOODS

A. Acceptable Products:

1. Kewaunee Scientific Corporation, Statesville, NC
2. Jamestown Metal Products, Inc., Jamestown, NY
3. Mott Manufacturing Limited, Brantford, ON, Canada

B. Description:

1. Fume hoods shall be of complete airfoil design to insure maximum operating efficiency. Foil sections at the front facias of the hood shall minimize eddying of air currents at the hood face and the rear baffle system shall minimize turbulence in the upper portion of the hood interior.
2. The hoods shall be of the Open bypass type. The fume hood design shall allow for automatic air bypass above the sash opening. The bypass shall limit the maximum air velocity through the face of the hood and provide for a constant volume of air through the hood regardless of sash position. The bypass shall control the increase in face velocity as the sash is lowered to limit the maximum velocity to not more than three and one-half, times the velocity with the sash full open.
3. Frame: A free-standing rigid frame structure of steel angle shall be provided to support exterior panels and interior liner and baffle panels. To allow for maintenance and replacements, the interior liner panels shall be removable without disassembly of the frame structure and outer steel panels. Likewise, the exterior steel panels shall be removable without disassembly of the frame structure and inner liner panels.
4. Walls: Double wall ends, not more than 4 IN wide, shall be provided to maximize interior working area. The area between the double wall ends shall be closed to house the re-

mote control valves. The front vertical fascia section shall have a full 135° 1 IN radius at the front leading edge to provide a streamlined section and insure smooth even flow of air into the hood. The vertical facias shall contain the required service controls, electrical switches and receptacles. Side posts cannot exceed 4 IN in width. The hood interior end panels and sash track shall be flush with the fascia to prevent eddy currents and back flow of air.

5. The hood exteriors shall be fabricated of cold rolled steel, phosphate coated with a baked chemical resistant, synthetic resin finish. Rear panel if rear side of hood is exposed to view; shall be finished to match material and color of remainder of hood's outer wall shell.
6. Interior liner panels shall be 1/4 IN thick fiberglass reinforced polyester sheet. Interior liner panels shall be fastened using stainless steel screws with plastic covered heads.
7. Access panels on both inside and outside of hood wall shall be provided. The interior end liner panels shall be furnished with an opening that provides access to the service piping and valves to facilitate installation and maintenance. The openings shall be covered with a removable panel with rounded corners. Panels which require tools to remove are not acceptable. The panel shall provide an overlapping seal on all edges.
8. Airfoil: A streamlined airfoil shall be installed at the bottom of the hood opening on bench hoods. This foil shall provide a nominal 1 IN open space between the foil and the top front edge of the worksurface to direct an air stream across the work surface to prevent back flow of air. The airfoil shall extend back under the sash, so that the sash does not close the 1 IN opening. The foil shall be removable to allow large equipment to be moved into the hood. The foil shall be of 12-gauge steel to resist denting and flexing.
9. Countertop: Construct countertops of 1 IN epoxy resin, with dished design to contain spillage with a 6 IN wide safety ledge across the front edge. Where countertops are penetrated by vent piping from fume hood base cabinet, piping shall be located behind the adjustable baffle and sealed tight all around at countertop with waterproof chemical-resistant sealant. A cup drain flush with the recessed worksurface shall be provided. The worksurface and cup sink shall be black. Continuous corrosion-resistant air-tight seam between hood lining and countertop shall be provided.
10. Fume Hood Cup Sinks:
 - a. Material: Epoxy Resin
 - b. Size: 3 x 6 IN nominal
11. Lighting:
 - a. Two tube T8 fluorescent light fixtures to generate 1075 lx (100 foot candles) of illumination inside hood.
 - b. The light fixtures shall be isolated from the hood interior by a 1/4 IN thick tempered glass panel sealed from the hood cavity.
 - c. Fixture shall be UL labeled.
 - d. Re-lamping performed from outside of hood front and shall not require removal of hood top-to-ceiling closure panel.
12. Baffles:
 - a. A baffle with three fixed horizontal slots shall be provided to aid in distributing the flow of air into and through the hood. The baffle shall be spaced out 2-1/4 IN from the back liner. The baffle shall be removable for cleaning.
 - b. Externally adjustable baffle slots, top, and bottom shall be provided. A single point baffle adjustment shall be provided that will allow adjustment of the upper and lower slots. This single baffle adjustment shall allow the operator to make adjustments without placing their hand further than 6 IN into the hood.
13. Duct Collar:

- a. 4 IN high and straight.
 - b. Outside Diameter: 10 to 12 IN.
 - c. Fabricated from UNS S31603 stainless steel.
 - d. Provide stainless steel transition if standard exhaust collar does not meet this requirement.
- 14. Vertical Rising Sash: A vertical rising sash of 1/4 IN laminated safety float glass shall be provided. The sash shall have a neutral colored polyvinyl chloride horizontal member at the top and a full length metal handle at the bottom. The sash shall be counterbalanced with a single weight to prevent tilting and binding during operation. The sash track shall be a neutral colored polyvinyl chloride set flush with the interior liner panels to minimize turbulence. Bench hoods shall have one sash in a single slotted sash track.
- 15. Sash height limiting hardware:
 - a. Provide each fume hood with integral sash height hardware which prevents raising vertical sash above a set point.
 - b. Set points to be at full closure and 18 IN.
- 16. Overall depth of hood: 36 IN.
- 17. Fan Operation Control: Shall be provided under Division 15 Mechanical.
- 18. Safety Monitor/Alarm System:
 - a. Acceptable Products:

Safety Monitor/Alarm System	Air Alert 300 by Kewaunee
	54L0405A4 by Fisher-Hamilton
 - b. Fume hoods shall be provided with an electronic safety monitor/alarm system to detect low hood face velocities and provide audible and visual alarm if face velocity drops below safe levels. The alarm system shall sense the actual face velocity of the hood regardless of sash position. The system shall have air velocity sensing thermistor located in the monitor on the face of the hood. The monitor shall have a green light activated when the face velocity is above the set point and a red light and audible alarm which are activated when the face velocity is below the set point. The audible alarm shall be acknowledged and silenced with mute switch on panel. When the mute is activated, it shall automatically reset itself when face velocity again rises above calibrated set point. Calibration is the responsibility of the Safety Monitor/Alarm supplier and is required once the hood is stationed and the hood exhaust and room supply systems are balanced. A secondary calibration shall be factory set, at approximately 70 FMP, into the alarm's memory only to determine that the alarm is functional and ready for shipment. The primary calibration must be completed in the field.
- 19. Closure panels:
 - a. Provide fume hood closure panels from top of each fume hood to the underside of the finished ceiling.
 - b. Match closure panels to fume hood's exterior color and finish.

2.05 ADAAG COMPLIANT OPEN BYPASS CHEMICAL FUME HOODS

- A. Acceptable Products:
 - 1. Kewaunee Scientific Corporation, Statesville, NC
 - 2. Jamestown Metal Products, Inc., Jamestown, NY
 - 3. Mott Manufacturing Limited, Brantford, ON, Canada
- B. Description:

1. General construction for the ADAAG compliant Chemical Fume Hoods shall be the same as for the Chemical Fume Hoods, except as follows:
2. ADAAG compliant open bypass fume hoods shall be designed to meet guidelines of the Americans with Disabilities Act (ADA).
3. It shall be complete with Sash Stop, mounted at 21" above the lower deflector to keep the sash from rising above the operators reach.
4. Fixtures and service fittings shall be moved down to within reach of wheelchair bound operator.
5. It shall be provided with radiused corner posts and airfoils for smooth air movement to assure high level of comfort, safety and efficiency.
6. Hood Support Structure and Base Cabinet for ADA Fume Hood shall be provided.
7. ADA guidelines require a space of 30" wide by 30" high by 25" deep for a wheelchair to roll beneath a fume hood.

2.06 BIOSAFETY CABINETS

A. Acceptable Products:

1. NuAire, Plymouth, Minnesota (Model # NU-425-600)
2. The Baker Company, Sanford, Maine
3. Labconco, Kansas City, MO

B. Description:

1. Six-foot, Class II Type A2, Biological Safety Cabinet, non-ducted, designed for biological work of low to moderate risk biological agents. All biologically contaminated plenums and work area side walls shall be of permanent metal construction and shall be maintained under negative pressure or enclosed within a negative pressure zone relative to outside air.
2. Cabinet shall be constructed of #18 gauge rolled-rolled steel, with #16 gauge stainless steel work surface. Radius (rounded) comers on the work surface. Side walls and rear walls to be one-piece construction. Exhaust and supply HEPA filters and motor blower system shall be removable and serviceable from the front of the cabinet without entry into workspace or removal of view screen. The cabinet shall be protected with a smooth baked enamel finish on all exterior cold rolled steel. The cabinet shall be equipped with stainless steel telescoping leg assemblies which shall allow for shipping the cabinet at a height of 74 7/8". The cabinet telescoping legs shall allow for the work surface to be 30" or 36" above the floor or be able to remove the legs to enable the unit to be used as a bench model.
3. The unit shall have a recessed work surface to retain spills, 3/16" radiused comers to provide for easy cleaning and a stainless steel ball valve to provide safe and effective drainage of the drain pan. A negative pressure shall be maintained at the upper side of the view screen relative to the external atmosphere of the cabinet.
4. The unit shall comply with CDC/NIH classification Class II Type A/B3 and NSF classification #49, 2002, Class II Type A2.
5. Unit shall be equipped with an "AirGARD" audio-visual mass airflow system to indicate when exhaust airflow drops below a set point. A warning light and buzzer on the front of the unit shall be activated when exhaust airflow drops below 5% of the set operating rate.

6. Work area shall be provided with two externally-mounted 115 volt duplex outlets with drip-proof covers and circuit breakers.
7. Lighting: Fluorescent lighting system with 200 foot-candles illumination at the work surface level.
8. Blower switch shall be provided with additional pole for interlocking unit with house exhaust system.
9. Laboratory Service Fixtures: Laboratory Service Fixtures shall be provided in the right or left work area side wall, as indicated on drawings.

2.07 METAL CASEWORK

A. Construction:

1. Unless otherwise indicated all base units under hoods shall be fabricated of cold rolled prime grade roller leveled furniture steel. Gauges of steel used in construction shall be 18 gauge except as follows:
 - a. Corner gussets for leveling bolts and apron corner braces, 12 gauge.
 - b. Hinge reinforcements, 14 gauge.
 - c. Top and intermediate front horizontal rails, apron rails and reinforcement gussets, 16 gauge.
 - d. Door assemblies and adjustable shelves, 20 gauge.
2. Performance of the painted surfaces shall match that of the fume hood outer panels.

B. Special Purpose Cabinets For Use Under Fume Hoods:

1. Acid Storage Cabinets
 - a. Where indicated, acid storage cabinets shall utilize the same gauges of steel and construction features as other base cabinets. In addition, they shall have a one piece liner insert made of linear low density polyethylene. The liner insert shall form a one-inch high pan at the bottom to retain spillage. Each door will have a set of louvers at the top and bottom. The door shall be lined with a polyethylene sheet. Each cabinet shall be vented into the fume hood with a 1-1/2 inch vent pipe. Providing a positive airflow directly into the fume hood exhaust system. See drawings for face dimensions.
2. Solvent Storage Cabinets
 - a. Solvent storage cabinets shall be specifically designed for the storage of flammable and combustible liquids. Construction shall be based upon the requirements listed by UFC, OSHA, and NFPA No. 30 - 1993. The bottoms, top, sides and doors shall be fabricated of 18" gauge steel and shall be all double panel construction with a 11/2 inch air space between panels. All joints shall be welded, or screwed, to provide a rigid enclosure. The doors shall swing on full length stainless steel piano hinges and shall be fully insulated. The right hand door shall be equipped with a three point latching device and the left hand door shall have a full height astragal. The doors shall be self-closing and synchronized so that both doors will always fully close. The right hand door shall be equipped with a three-point latching system that automatically engages when the doors close. Each door shall be equipped with a fusible-link hold-open feature that will ensure the door closes should the temperature outside the cabinet exceed 165 degrees Fahrenheit. Units 24 inches long shall have only one door, self-closing, and equipped with a three-point latching system and hold-open feature. A 2 inches deep liquid tight pan that covers the entire bottom of the cabinet shall be furnished to contain liquid leaks and spills. A full-depth ad-

justable shelf shall also be provided. The shelf shall be perforated to allow air circulation within the cabinet. Two diametrically opposed vents with spark screens shall be provided in the back of the cabinet as well as a grounding screw. The cabinet shall have interior finish same as exterior. The cabinet shall be labeled: "FLAMMABLE - KEEP FIRE AWAY". See drawings for face dimensions.

C. Vacuum Pump Cabinets

1. XXX
2. XXX
3. XXX

D. Goggle Cabinets

1. Acceptable Manufacturers & Products:
 - a. Kewaunee Scientific Corporation, Statesville, NC (Model # F-5334-00)
 - b. Leonard Peterson & Co., Auburn, AL
 - c. Lab Repco, Horsham, PA
2. Description:
 - a. The goggle cabinet shall provide dry sterilization using ultraviolet radiation.
 - b. When the doors are closed and locked, the interior can be flooded with ultraviolet, killing bacteria. A safety closure mechanism automatically shall shut off the ultraviolet when the doors are opened.
 - c. A built-in timer shall control the sanitizing.
 - d. It shall be constructed of heavy-gauge steel.
 - e. The cabinet shall hold 30 pairs of goggles.
 - f. Dimensions: 24" W x 30" H
 - g. UL listed.

E. Accessories

1. Fasteners and Anchors: Size and type to securely fasten and anchor items to substrates and supporting structure.
2. Provide miscellaneous fillers and panels required for a finished installation.

2.08 OVERHEAD SERVICE CARRIERS

- A. Unit shall be designed to carry all media services including gas, data and power. Service carriers shall be pre-plumbed, designed to accept standard plumbing fittings, and pre-wired to single location and UL listed. Service carrier shall be 18 inches wide and shall be designed in separate interchangeable sections. Each section shall have pre-punched plumbing fixture and electrical fixture mounting opening. Future use of unused openings shall not require field modifications. Openings shall incorporate integral covers that remain and cover holes when not in use or when fixtures are removed. Internal strut supports shall be designed for securing supply lines (by others) with strut type clams. Service carrier shall be formed steel structure that allows access to fixtures from either side of unit. Exterior and interior finish to be epoxy powder coated. Service carrier shall allow clear unobstructed access and use of furniture below. Service carrier shall incorporate integral ceiling supply umbilical and/or threaded rod supports for each service run. Above ceiling supports shall be tied to building structure to provide adequate support. Overhead carrier "run" shall be supported every 6 feet minimum, as required to provide adequate support to each section. Unit shall be provided complete with end caps, rod supports, ceiling post assembly umbilical supports, and all accessories required for a finished installation.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. For General Installation Requirements, applicable to this and all other Casework Specification Sections including, but not limited to, examination, installation, adjusting, cleaning, and protection general requirements, refer to Specification Section 12340 - Laboratory Casework - General Requirements.

3.02 ADDITIONAL INSTALLATION REQUIREMENTS

- A. Fasten together assemblies to meet Performance Requirements specified above.
- B. Floor Mounted Cabinets:
 - 1. Locate at designated positions.
 - 2. Level by means of adjustment device located in cabinet's bottom corners.
 - 3. Continuously seal space between base cabinet and floor with sanitary silicone specified in Division 7.
- C. Countertops: Anchor to base cabinets.
- D. Field Joints:
 - 1. Reinforce and weld in manner equivalent to shop welds and joints.
- E. Wall Joints:
 - 1. Joints between equipment and walls up to 3/8 inches wide:
 - a. Fill with sealant backing bond breaker rod and silicone sealant.
 - b. Comply with requirements of Division 7.
 - c. Apply sealant in one continuous pass, compressing surface slightly concave and forcing contact with both sides of joints.
 - 2. Joints between casework and walls larger than 3/8 inches wide:
 - a. Seal with stainless steel closure or filler strip.
 - b. Fit tightly and fasten securely with concealed clips.
- F. Site Tolerances: Install wall-to-wall countertops with a maximum 1/4 inch gap.

END OF SECTION 12345